

Reporting Cost Information in the Historical Cost Analysis System (HCAS)

Purpose

The purpose of the HCAS is to collect historical cost data from environmental management projects/activities in order to provide valuable cost information to estimators, managers, and analysts. The HCAS is a tool for estimating and managing environmental management projects/activities, establishing benchmarks, and developing more accurate estimating models.

Background

The cost collection tool discussed here is based on the April 1998 version of the phase based Hazardous, Toxic, and Radioactive Waste (HTRW) work breakdown structure (WBS) developed by the Interagency Cost Estimating Group¹. This WBS is an enhancement to the original set of HTRW WBSs and is a comprehensive hierarchical list of activities (i.e., tasks, items, or products) that may be required to accomplish environmental restoration, waste management, or facility decommissioning and dismantlement projects.

The HTRW WBS is an activity based structure that provides sufficient depth (detail) and breadth (coverage of project types) to accommodate similar projects and programs throughout the Environmental Protection Agency (EPA), Department of Defense (DOD), Department of Energy (DOE), other agencies, and industry. The structure provides enough detail and logical progression to standardize elements of work associated with this wide range of projects and programs.

The first level of the HTRW WBS is life-cycle phase. The intent of this structure is to provide a life-cycle perspective of each program or project whether environmental restoration, waste management, or facility decommissioning and dismantlement. The six phases are:

- Phase 1 - Preliminary Site Investigation/Preliminary Phase
- Phase 2 - Site Investigations/Studies and Research and Development
- Phase 3 - Remedial Design/Pre-construction
- Phase 4 - Remedial Action/Construction
- Phase 5 - Operations and Maintenance
- Phase 6 - Post Closure Surveillance and Long Term Monitoring

For each phase, it is anticipated that costs will be collected at Level-3 of the HTRW WBS. Level-3 has been chosen for collection of cost data in the HCAS because this level is not too cumbersome and will not require extra resources.

To make the HCAS data valuable to the estimators, managers, and analysts, additional cost driving parameters must be identified. Cost driving parameters are data that characterize activities and significantly effect cost. These cost driving parameters are readily available to the work managers who are acquainted with the work and can be included while reporting the cost data without requiring additional resources. As an example, element 4.18.01 (Phase 4) Extraction Wells will commonly have an associated parameter of each (i.e., \$X/each well). However, additional cost driving parameters are necessary to define the activity in a

Note: For more information on the HTRW WBS, see Phase Based Hazardous, Toxic, and Radiological Waste (HTRW) Work Breakdown Structure, April 1998, First Draft.

meaningful way. The additional cost driving parameters would include site conditions, contamination type, protection level, full-time equivalent workers, duration of construction, depth of well, diameter of well, type of equipment used to install the well, and the physical state of the media/materials used. This information should be accessible to the work manager. Cost driving parameters are defined and discussed further in the following section.

Cost Driving Parameters

The cost driving parameters which need to be reported in the HCAS for individual activities are presented in Attachment A in a matrix format. The matrix has Level-3 HTRW WBS activities on the Y- axis and anticipated cost driving parameters for the activities on the X-axis.

The X-axis includes the full range of cost driving parameters for Level-3 activities; this presents a challenge: many of these parameters are only applicable to certain activities and phases of activities. Therefore, cost driving parameters which are applicable and essential only to certain activities and phases are identified, or “marked,” with the applicable phase number for those activities. For example, depth is an applicable and essential cost driving parameter for an activity of dredging/excavation, but it certainly does not apply to program management. In addition, depth applies to Phase 4 (Remedial Action/Construction), but it will not be necessary to collect for Phase 5 (Operations and Maintenance). Hence, depth would be marked with a “4” for dredging/excavation but not for program management. It is very important to note that this system does not preclude entering data for non-marked parameters. If a project/work manager believes that a non-marked parameter is a cost driving parameter, he/she should report data for that parameter.

Another important aspect of this structure is assignment of HTRW WBS units of measure. A unit of measure is the primary data point which best represents the activity. For instance, a Phase 5 activity of pumping would have a unit of measure of “rate,” because the pumping rate defines the activity better than other information, such as the duration of pumping. Units of measure are discussed further in the following discussion of categories.

The cost driving parameters have been divided into four categories:

- Project/Activity General Information
- Other Project/Activity Parameters
- Metrics
- Descriptive Parameters

These categories are defined as follows:

PROJECT/ACTIVITY GENERAL INFORMATION

These parameters provide general information regarding the individually reportable activity. These parameters are essential and required for each activity. Parameters within this category include start date, end date, quantity total, unit of measure in contract, total cost, and location. These parameters are defined as follows:

- Unique Task Identifier - allows the user to divide individual activities into independent sub-activities for reporting purposes. For example, a project activity involving installation of extraction wells can be subdivided into individual wells (i.e., into sub-activities), and cost can be reported for each well installation.

- Start Date - date on which the activity is initiated
- End Date - date on which the activity is completed
- Quantity Total - quantity as measured for payment (e.g., payment is ~~200~~ cubic meters of soil removed)
- Unit of Measure in Contract - the unit used in measuring the quantity for payment (e.g., ~~unit is~~ for 200 **cubic meters** of soil removed); this may or may not be the same as the unit of measure in the HTRW WBS
- Total Cost - total cost of the activity from start to end of activity
- Location - where the activity was performed (e.g., on-site or off-site)

PROJECT/ACTIVITY SPECIFIC INFORMATION

These parameters provide specific information which is applicable to that activity and can be chosen from the criteria provided for the individual parameter (i.e., the user will select from a list of options). In this section, only the parameters that were deemed essential and required are marked with applicable phase numbers. Parameters within this category include security requirements, site conditions, contaminant type, and protection level. These parameters are defined as follows:

- Security Requirements - indicates if special security or safeguards are required for the activity
- Site Conditions - specifies whether 1) difficult working conditions existed due to rain; 2) difficult working conditions existed due to temperature; 3) difficult working conditions existed due to interference from other activities; or 4) difficult working conditions existed due to another factor (for number 4, more information will be required; data is to be entered in the category of Descriptive Parameters below)
- Type of Contamination - contamination as defined by MPC, RPC, and CPC codes from the DOE Waste Treatability Group Guidance, January 1995; these codes are included in Attachment ~~1B~~ **1B**. This attachment is not available electronically at this time. Please contact Mike Breck at 301-916-7389 for a copy.)
- Protection Level - level of worker protection required for the activity which would include Level A, B, C, or D

METRICS

These parameters uniquely define the activities in measurable terms. As a note, the use of the word metrics should not be confused with the metric system of measure. Each parameter has been assigned an HTRW WBS unit of measure which is denoted by bold type. This unit of measure may differ from the unit of measure in the contract. The HTRW WBS unit of measure is defined in order to maintain a single, consistent unit of measure for each activity in HCAS. In this section, only the parameters that were deemed essential and applicable are marked with phase numbers. Parameters within this category include full time equivalent (FTE) workers, lump sum, duration, distance, vertical, length, width, diameter, area, volume, weight, rate, and number. These parameters are defined as follows:

- FTE - total number of personnel (including summation of part time)
- Lump Sum - dollar amount used for cost elements such as Tipping Fee and activities that do not have a different metric that best represents the activity (i.e., unit of measure)
- Duration - time period over which the activity took place (e.g., days, weeks, months, years)
- Distance - linear measure of travel (e.g., distance waste is transported)
- Vertical - linear measure from ground level up (e.g., the height of a building) or ground level down (e.g., depth of wells)
- Length - horizontal linear measure along one axis (e.g., the length of a road)

- Width - horizontal linear measure along axis perpendicular to length (e.g., the width of a road)
- Diameter - linear measure through the center of a circle to the opposite circumference (e.g., pipe diameter)
- Area - measure in two dimensions of surface within a boundary (e.g., area decontaminated in a facility)
- Volume - measure in three dimensions within boundaries on three axes (e.g., volume of waste to be disposed); as a note, “volume” is generally the capacity of equipment for Phase 4 activities
- Weight - measure of mass (e.g., weight for tipping charges)
- Rate - measure of another metric over time (e.g., pumping rate of volume per minute)
- Number - quantity of objects often referred to as each (EA) (e.g., number of wells)

DESCRIPTIVE PARAMETERS

These are the parameters where the project/work manager will provide information in a descriptive format that he/she considers has effected the cost of the activities. This section is unique in that only the project/work manager will be able to decide which parameters are applicable. Therefore, only the parameters that were deemed essential are marked. Parameters within this category include type of equipment, physical state of media/materials used, classification of work, special conditions or special technology parameters, special technology requirements, and any other factors effecting cost. These parameters are defined as follows:

- Type of Equipment - description of the equipment used during the activity (e.g., heavy equipment, light equipment, remotely operated)
- Physical State of Media/Materials Used - type of media through which work was conducted (e.g., sand, gravels, consolidated/unconsolidated soils, vadose/saturated zone) or additives to the process (e.g., microbes, nutrients).
- Special Conditions or Special Technology Parameters - cost driving parameters not identified previously (e.g., pH, oxygen content, moisture, climate, operating temperature, solubility, volatility)
- Special Technology Requirements - requirements specifically related to the technology which may be important for its application at other sites (e.g., amount of electricity required, permeability of barriers, amount of shielding required, special designs)
- Any Other Factors Effecting Cost - cost driving parameters that are not covered elsewhere

Note: The Project/Activity Specific Information and Metrics parameters shall be used to narrow the selection of activities from the database which are similar in nature. This feature of the HCAS database will make it user friendly and easier to interpret and analyze the data.

Reporting Cost Data

Whenever any project or project activity is complete, as defined in the dictionary of that activity, and all associated costs are known, the cost data can be reported in the HCAS along with the cost driving parameters. Therefore, the timing for reporting the cost data of a project or an activity will be determined by the project/work managers. Reporting the information on completed activities as early as possible is the best strategy, as the cost, cost driving parameters, and other special circumstances will be fresh in the work manager’s mind.

